

*2. Report
with Dr. Christison's comments*

REPORT
OF THE
ROYAL COLLEGE OF PHYSICIANS
OF EDINBURGH
ON THE
ADULTERATION OF DRUGS.

2D MARCH 1838.

EDINBURGH:
ADAM & CHARLES BLACK, NORTH BRIDGE.

MDCCCXXXVIII.

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Edinburgh, 2d March 1838.

AT an Extraordinary Meeting of the Royal College of Physicians held this day, to consider a Report from a Committee of its Fellows respecting the Adulteration of Drugs, the following Resolutions were agreed to :

1. That the College approve of this Report, and adopt it, and direct it to be published in terms of the recommendation of the Committee.

2. That the thanks of the College be given to Dr Christison, Secretary to the Committee, for the very great trouble he has taken in collecting the information on which the Report is founded.

(Signed) in name of the College,

W. P. ALISON, *President.*

REPORT of the Pharmaceutia Committee of the Royal College of Physicians on the Adulteration of Drugs, 24th January 1838. At a meeting of the Committee held this day for considering finally a remit from the College to inquire and report respecting the extent of the adulteration of drugs and the means of abating the practice,—present *Dr Alison*, President, and *Drs Davidson, Abererombie, Graham, Poole, Traill, Ransford*, and *Christison*,—it was resolved after careful deliberation to report as follows :

1. That the adulteration of drugs is undoubtedly carried on at present to a great extent, and affects more or less a great proportion of the most important articles of the *Materia Medica*.

2. That, while these adulterations may be presumed to be

practised in a variety of quarters,—by the foreign producer, foreign merchant, wholesale druggist, chemical manufacturer, and retailer,—some of the more obvious or discoverable sources of the evil are the inadequate education of retail druggists, especially in practical chemistry,—the want of an authorized system of simple tests for ascertaining the purity of drugs,—the want of any check for preventing adulterations,—and the necessity, real or supposed, for lowering the prices, and of consequence the quality of drugs, in order to meet the unreasonable demands of the public.

3. That the practice of adulterating drugs will be probably diminished by the College of Physicians adding to the Pharmacopœia, as it has resolved on doing, a list of simple characters for the articles of the *Materia Medica*, by means of which they may be ascertained to be of the requisite degree of purity for medicinal use, and free from certain known adulterations.

4. That, while this system may prove very efficacious by furnishing retail druggists with the means of detecting adulterations practised elsewhere, and thus of securing their own true interests, it is highly desirable that the education of persons intended for this profession should be elevated as well as regulated and ascertained by some competent authority; and that in this way important benefits would be conferred on the profession itself, on medical practice, and on the public generally.

5. That the adulteration of drugs, provided the two previous measures were enforced, might be in a great degree put an end to by a methodical system of visitation of public shops; which, notwithstanding some failures in this country, your Committee are inclined to think may be rendered efficient under certain conditions, and more especially if conducted mainly by an organized and well-educated body of druggists themselves.

6. That advantage would also be derived from stated authoritative advertisements of the wholesale prices of genuine drugs, and authoritative announcements of newly discovered adulterations.

7. That, although your Committee do not think it their duty at present to suggest any specific means for carrying the above-mentioned measures into effect, they would strongly recommend that the state of the case be made generally known by the authority of the College, and for this end that the College shall publish this Report, together with an Appendix consisting of detailed observations on the subject, which have been communicated to your Committee by their Secretary, and are lodged herewith.

8. That the proceedings of the College be communicated to the Royal College of Surgeons, with the view of ascertaining whether, and in what way, the two bodies may co-operate in carrying into effect any resolutions that on careful inquiry may seem to them advisable.

In name of the Committee,

R. C. Sec.

A P P E N D I X.

OBSERVATIONS

ON THE ADULTERATION OF DRUGS,

BY

DR CHRISTISON.

It is well known to every one practically conversant with pharmacy, that the adulteration of drugs is at present practised in Britain to a most injurious extent, and a general feeling prevails that it has been for some years past upon the increase. Whether this impression be correct or not, there can be no doubt of the extreme frequency of the practice. It may be safely averred as the result of the best inquiries on the subject, that few medicines in general use escape occasional sophistication; that some are scarcely ever pure; that the impurities are frequently so great, as to render the articles nearly or entirely inefficacious; and that medicines of this kind are to be found occasionally in the shops even of the most respectable druggists, and notwithstanding great pains on their part to obtain and dispense nothing but what is genuine.

For some years past the attention of the College of Physicians of Edinburgh, in some measure the guardians of the public in this matter, has been pointedly turned to an evil so serious, and so disgraceful to the present improved state of pharmacy. The College of Surgeons of this city have also been led more recently to inquire

into the subject ; and have appointed a committee to examine into the extent of the practice, and the means of abating it. A short time ago the former College was requested to co-operate with its sister institution, and the two bodies have resolved to join in the investigation. It cannot be doubted that they will proceed cordially in the task they have thus laid down for themselves ; and it may be confidently anticipated that their labours will not terminate without some important practical results. It is to accelerate their operations, by making the existing state of the question generally known, so far as my inquiries have hitherto gone, that the following observations have been drawn up.

I believe I shall be most likely to attain the object in view, by treating the subject under the three subsequent heads. It will be right, in the first place, to show from actual examples, that the adulteration of drugs is practised to an extent injurious to the success of medical practice, and in a way which defies the caution even of well informed and conscientious druggists. An attempt will next be made to point out the sources of these adulterations, that is, the quarters where the practice is carried on, together with the circumstances in the commercial history of drugs which seem to have led to it. And lastly,—a sketch will be given,—but with due diffidence on a subject of such intricacy, and surrounded by so many difficulties,—of those measures which appear practicable, and most likely to diminish the evil.

I. Under the first of these heads, it might perhaps be sufficient to refer to the general conviction of the profession, or to what has been written on the adulteration of medicines in various excellent works on *Materia Medica* and Pharmacy. But it will bring the matter more home to the minds of all, if some details be entered into, consisting of a few facts which have chiefly occurred to my own observation, and among which are some, not unimportant, yet either unknown, or but little attended to in any pharmaceutic works. With this view is subjoined the following list of adulterations, which could be easily extended, were it necessary.

1. A few years ago I directed the attention of medical men to the frequency of the adulteration of *Iodide of Potassium* with Carbonate of Potash. A faint contamination of this nature is exceedingly common, because it can with difficulty be avoided in

the manufacture of the salt ; but impurity from this cause is of little consequence to medical practice, because it never exceeds one, two, or at the utmost five per cent. Not unfrequently, however, it amounts to ten per cent or upwards, for which carelessness is the lightest excuse that can be found ; and I have examined specimens, at one time very generally to be met with in this country, where the carbonate with its accompanying water amounted to ninety parts in the hundred,—which, it need scarcely be said, was an express sophistication. Can we wonder then, that practitioners should complain of the iodide of potassium, that they have given it for months, nay even for years, without observing any effect either on the constitution, or on the disease for which it was administered ? Another adulteration is with muriate of soda or potash. Some have considered this to be a frequent impurity. But I have not met with it so often as the other, and it has appeared to me always less in amount, seldom surpassing ten per cent. It is an intentional adulteration ; at least there is no circumstance in the processes for preparing iodide of potassium which can lead to its accidental introduction, except in small quantity.

2. *Iodine* itself is another instance. Various impregnations of Iodine have been indicated by authors, such as with oxide of manganese, brick dust, and other substances of a fixed nature ; which however I have never met with throughout a long train of investigations. But there is another impurity, at present seldom wanting in British iodine, and which has not yet been publicly noticed. This is with water. It is probably not very easy to prevent a certain impregnation with water. But nothing except gross carelessness or fraud will account for the presence of fifteen per cent which I have separated, or for twenty per cent, which I am informed by M. Robiquet of Paris is not unfrequently found in the British iodine imported into France. Perhaps this amount of impurity is not of very material consequence to medical practice, the variation of the dose by a fifth part being probably not so important as many would have us think. The admixture however is not the less a fraud,—a fraud, I may add, which, according to M. Robiquet, has of late greatly reduced the demand in France for iodine of British manufacture.

3. Another good example is the spirit of *Nitric Ether*, a medicine of much value, and in most extensive use. I have not myself made any experiments upon its adulterations. But the

subject may be equally well illustrated from the evidence delivered in 1834, by Mr Cooper, Lecturer on Chemistry in London, before the Medical Education Committee of the House of Commons. Mr Cooper, while travelling between Bath and London, happened to call for an acquaintance, a chemist and druggist in one of the intermediate towns. During his visit, the travelling member of a wholesale house in London called in pursuit of his occupation, and among other things offered for sale the spirit of nitric ether. His customer asked him its price, to which he replied that he had it of three prices; 2s., 3s. 6d., and 4s. 6d. a pound. The retailer ordered the article of the second quality. This drug is subject to a certain variety, because it is not a regular and definite compound, but a mere mixture of rectified spirit and nitric ether. Certain differences must exist, according as it is prepared by the process of the Edinburgh, the London, or the Dublin Pharmacopœias. But it need scarcely be said that no such differences will account for so extravagant a variety of price, as that mentioned by Mr Cooper, and that the two inferior qualities of the drug must have been adulterated, probably with rectified spirit, or the cheaper addition of water.

4. A most important set of adulterations are those practised upon substances of very great energy, and which are given in minute doses. For here it is not merely a fraud that the public must submit to; life itself may in consequence be brought into danger. Of this, *Hydrocyanic Acid* is an excellent example. The profession are generally aware of the extreme uncertainty of the strength of this formidable medicine. The fact has been often brought experimentally under my notice; but I prefer at present to quote some recent observations made by Dr Fyfe, and presented by him in a Report to the Committee on Adulterations appointed by the College of Surgeons. Few medicines perhaps are subject to so many sources of variation as hydrocyanic acid. It is prepared by different processes, which are calculated to yield it of various strengths. Variations arise even where the same process is followed, according as the rapidity of the distillation varies, or the temperature of the refrigerator. It loses some of its acid unless carefully preserved. And a further diminution invariably occurs in the shop of the druggist, as the contents of a bottle are gradually dispensed. For one or another or all of these reasons the proportion of real acid differs exceedingly. Among samples

obtained in shops of great respectability, Dr Fyfe found some that contained four times as much as others. Serious accidents might in consequence ensue in medical practice. This medicine is variable in its effects in different constitutions ; and, therefore, the physician must always begin with a very small dose, and gradually increase it till the effect he desires be obtained. Now, suppose he has begun with the weakest acid of the shops, that he has brought up the dose, as may well happen, to ten, fifteen, or even twenty drops, and that then, the store of this sample being exhausted, the druggist betakes himself to an article, which, unknown to him, is of four times the strength. What is likely to be the result ? The death of the patient would be not improbable.

5. Let me add another instance of the like kind. The active principle of nux-vomica, *Strychnia*, now currently employed as a remedy in the chronic forms and stage of paralytic affections, is very little inferior in energy as a poison to hydrocyanic acid. In the shops it is scarcely ever met with pure ; because even the impure article bears a very high price, and because its complete purification, besides being troublesome, and probably unnecessary in respect of its excessive energy, cannot be accomplished except at such loss as would raise its value from fifty shillings to five or six guineas an ounce. The article of the shops always contains a large proportion of another alkaloid, brucia, whose effects on the animal body are precisely the same in kind, but much inferior in degree. This impregnation is probably advantageous rather than the reverse ; because by diluting a drug of such tremendous activity as strychnia, it is rendered more manageable in medical practice. But another impurity, of great consequence in a medicinal point of view, is inert colouring matter. The proportion of this varies much, some specimens having a dark-brown colour, others a light grayish-brown, and some being very nearly colourless. It is almost unnecessary to point out the serious consequences which may ensue from such irregularities in the strength of so potent a medicine. The danger is the greater, that, in order to do any good in palsy, it must be given in such quantity as to excite a certain degree of its physiological or poisonous influence. An accident which happened not long ago in my own practice will sufficiently illustrate what is here stated. A man affected with palsy took every evening gradually increasing doses of a strychnia less pure than the average, till at length one evening the dose was directed

to be increased from two-thirds to three-fourths of a grain in two pills. At the same time the sample of the medicine supplied by the apothecary was changed for one almost of snowy whiteness, and consequently far purer. Through some lucky whim the patient took only one pill. In the night time he was attacked with violent tetanic convulsions, protracted spasms of the extremities, severe locked-jaw, violent opisthotonos, spasmodic fixing of the chest, and all the other formidable symptoms of poisoning with this alkaloid; in which state he continued for several hours. From all we know of the effects of strychnia, there can be little doubt that had he taken both pills the issue would have been fatal.

6. Apt illustrations may also be taken from vegetable drugs of a compound nature, into which impurities may be introduced accidentally, or by design, more easily perhaps than into any other description of medicines, and where also the detection of them is sometimes exceedingly difficult. Under this head I shall take as examples three of the most familiar and most valuable articles of the *Materia Medica*, namely, Gamboge, Scammony, and Opium. *Gamboge* is one of those purgatives, to which some physicians entertain a dislike on account of its supposed irregularity and violence of action. But this notion has always appeared to me founded on prejudice; for after extensive trial of it, often without any adjunct except inert powders to facilitate fine division, it has appeared to me equally manageable, safe, and uniform in effect, with any other active cathartic. Various causes may be assigned for its occasional irregularity of action. Whether its sophistication is one cause I know not; but the frequency and extent of the adulterations of gamboge are sufficient to account for the variations complained of. I have been led to pay particular attention to this subject,—which, by the way, is not noticed in any work on pharmacy I have seen,—in consequence of having lately made a detailed inquiry into the sources and composition of the different kinds of gamboge, which has been published in the *Companion to the Botanical Magazine*. Three kinds of the drug are known in the English market, which all come from Siam by way of Singapore, namely, Pipe, Lump, and Coarse Gamboge. The first is perfectly pure, consisting of resin, gum, and a little moisture; and the resin, its active part, amounts on an average to 73 per cent. The two others, which a person of skill can easily distinguish in mass, but not so easily in powder, are invariably

adulterated. The impurity is probably some compound amylaceous matter, for there is both fecula and lignin; and, for reasons I need not stop to explain, it must be introduced intentionally. The amount in lump gamboge is about 11 per cent, probably too little to affect appreciably its medicinal activity. But in the coarse gamboge,—which some class with the lump variety, and with reason, since its composition is the same in kind,—the proportion of impurity is much greater. I have found in one specimen 23 per cent of fecula, lignin, and moisture together; and in another so much as 51.5 per cent. In the latter the active resin amounted to no more than 35 per cent, or less than one-half the due proportion. It cannot be doubted that any one, who should take the same dose of such a sample one day, and of the pure variety the next, would find very good cause to complain of the precarious action of gamboge.

7. Few articles of the *Materia Medica* present a history more full of interest than *Scammony*. Known and described by Dioscorides about two thousand years ago, it has been handed down from century to century, through an almost unbroken series of physicians and authors, even to the present time. The descriptions of those who speak from actual observation correspond on the whole closely with the characters of the modern drug; but, which is of more consequence to us, all complain of its frequent adulteration; and, singularly enough, the very kind of adulteration practised seems to have undergone little change. In some parts of the Continent it has no great reputation, and is not much in use. In Britain, however, its consumption is very great; which may be easily inferred from its forming a large part of the compound colocynth mass, one of our most familiar laxative pills. No substance is so seldom to be met with genuine as scammony. The utmost efforts of the druggist to obtain it pure are often unsuccessful for a long period of time; and I have met repeatedly with well-informed members of the trade, who had never seen it in that state, and did not know what it was when it was presented to them. I have made many careful observations on this subject, which will soon be made public. At present a few facts will suffice. Pure scammony, which possesses a pretty clear resinous fracture and lustre, is composed, according to repeated analyses I have executed, of resin, gum, a few grains of sandy matter, and a little moisture. The gum amounts to 8 per cent,

and the resin, its active principle, varies from 77 to 83 per cent, according to the age and consequent dryness of the specimen. Such scammony has for some years cost in the wholesale market about thirty-two shillings a pound; but it is rarely to be met with. The principal part of the scammony in the shops costs only from fourteen to eighteen shillings a pound; which is alone evidence enough that it is a spurious article. Three adulterations have come under my notice,—with chalk, with some amylaceous matter, and with both conjoined. The first variety has very much the appearance of our grey limestones. I may mention the composition of one merely out of a great number I have analyzed. It contained 31.5 per cent of carbonate of lime, more sandy impurities than usual, and only 43.5 per cent of its active principle, the resin. The next variety, which may be called amylaceous scammony, presents a variable proportion of fecula, and along with this a less proportion of a principle corresponding in properties with lignin. Of several specimens of this kind I have examined, there is one which contained 20 per cent of fecula, and about 10 of lignin; and its active resin formed only 37 per cent, being less than one-half of that of the genuine drug. This adulteration is not materially different from that indicated by Dioscorides; who says that the makers of scammony mixed with it the ὄσοςτρον αλευρον, the flour of a species of pulse, believed on the authority of Sibthorpe to be the *Ervum ervilia*, or bitter vetch. The amylaceous scammony presents commonly an ash-grey colour, and generally a waxy, but at times a somewhat resinous lustre. The last adulteration of importance is with fecula and carbonate of lime together. The appearance of this sort is much the same with that of the last. Frequently where there is a large quantity of chalk, I have found about 4 per cent of fecula, for the presence of which it is not very easy to account; but often also the proportion is much larger. In one specimen I have found 18.5 per cent of carbonate of lime, and about 17 of fecula and lignin; and the resin amounted to 42.5 per cent. Now, all these spurious samples, containing only about half the active ingredient of the pure drug, were considered to be fair average specimens of the scammony of the English market. It need scarcely be added, that the compound colocynth pill made with pure scammony, instead of the common article of the shops, is very different in power from the pill usually met with. It has appeared to me, as we should expect, about twice as strong.

8. Our knowledge of the adulterations of *Opium* is far from being precise. There is no substance used in medicine, into which, on account of the vagueness of its external characters, and the exceeding complexity of its composition, impurities may be more easily introduced in such manner, as to escape the notice of the practical druggist, and the researches of chemical pharmacy. At the same time it may be doubted whether the impurities indicated by pharmaceutic authors, such as stones, sand, saw-dust, or extract of poppy leaves, are of common occurrence. Most of these substances would be easily detected by the eye and touch of a skilful druggist, and extracts by the change occasioned in the odour. I have no new facts to add under this head. I am ignorant of the nature and extent of the adulterations of opium. But there is also another cause of variation, which is perhaps of at least equal consequence. It is well known that varieties in the plant, differences in climate, and probably too differences in soil and cultivation, are the source of great variations in this drug. The opiums of the Levant, of Egypt, and of Bengal, differ in their external characters and composition to a greater degree than almost any other vegetable remedy; and even that of one region varies remarkably, and in a way that can scarcely be ascribed to express adulteration. Owing to one or other or all of these causes, the opium of the English market, which comes chiefly from the Levant, is exceedingly variable in quality. The only certain method, in my opinion, of determining the quality of opium, is by detaching its morphia, especially in the form of muriate. In the form of muriate the whole active principle may be separated in a state of great purity. Now, the proportion of this salt obtained from good opium, according to my own analysis, and the experience of a very skilful manufacturer in this city, is an ounce and a-half avoirdupois per pound, or about ten per cent; and in one fine specimen of Smyrna Opium, I obtained so much as one ounce and fifteen drachms, or 12 per cent. But according to information communicated to me by the same gentleman, he has sometimes obtained in his operations upon a large scale so little as one ounce per pound, or a trifle more than 6 per cent. Here then is a variation in quality in the ratio of one to two nearly. It is material to add, as exemplifying a statement repeatedly made above, that these opiums were very nearly of the same price, were supplied by a highly respectable wholesale druggist to an

experienced manufacturer, and were believed by both to be at least of good average quality ;—an excellent proof of the uncertainty of its external characters, by which alone practical men in this country judge of its value. In medical practice we hear constant complaints of the disappointments experienced in using opium and its galenical preparations, owing to the varieties produced in their action by peculiarities of constitution, or by the state of the patient at the time ; and it would be the height of folly to deny the influence of these disturbing causes. But we likewise know that varieties equal in degree and the same in kind may be occasioned by varieties in dose. I have sometimes traced to this source unpleasant effects which were at first believed to depend on idiosyncrasy. May it not then be worth while to inquire whether the irregularities, apparently depending on the constitutional or incidental state of the patient, do not originate more frequently than is at present thought in mere differences of dose ?—seeing that the drug must be often administered to different individuals, and to the same individuals in different circumstances, in doses of which one may be twice as great as another.

9. To these instances of the adulteration of drugs, in the state in which they are supplied to the retail druggist, it might be well to append parallel examples of the same practice in the case of the galenical preparations of the *Materia Medica*, which are usually made by the retailer himself. Many adulterations of this nature have come under my notice ; but it has not been in my power to examine them with much accuracy, because, on the one hand, the processes for the purpose are often tedious and sometimes unsatisfactory, while on the other hand, some adulterations can scarcely be brought at all under the cognizance of chemical analysis. I shall therefore be satisfied with mentioning one only, which I have carefully examined, out of a list which, with more leisure, would easily furnish many similar illustrations. This is *laudandum* ; which, as may be inferred from what has just been said, is liable to vary in consequence of varieties in the crude drug employed in preparing it, but which the following facts will show to vary to a degree which cannot be ascribed to that circumstance alone. Laudanum, which I prepared from first-rate Smyrna Opiums, according to the proportions of the Edinburgh Pharmacopœia, contained 19.1 and 22.1 grains of solid matter, [dried in the vapour-bath till it ceased to lose weight] in a

fluid-ounce avoirdupois ; and, by a process directed towards the separation of the morphia contained in these laudanums, their value proved to be such as may be represented for the sake of clearness and simplicity by the numbers 120 and 130 respectively. With these facts as the basis for comparison, I have examined laudanum from no fewer than seventeen shops, fourteen of them in this city, and three in one of the chief county towns in Scotland. The results are given in the following table, from which it may be inferred that, according to one method of examination, the difference between the laudanums of the shops in point of strength is in the ratio of three to one, and that by the other, probably more accurate method, the actual difference in value is even greater.

| | | <i>Solid part Relative of 1 fl. oz. morphia.</i> | |
|---|--|--|-----|
| | | | |
| { | 1. Prepared by myself from finest Smyrna Opium | 22.1 | 130 |
| | 2. Do. Do. also from fine Sm. Op. somewhat inferior, | 19.1 | 120 |
| | 3. Do. Do. from inferior opium, | 21.0 | 90 |
| | 4. From one of the best class of shops in Edinburgh, | 17.1 | 130 |
| | 5. From another do. do. | 10.0 | 40 |
| | 6. From a third, do. do. | 20.2 | |
| | 7. From a fourth, do. do. | 20.8 | |
| | 8. From a fifth, do. do. | 12.3 | |
| | 9. From a sixth, do. do. | 18.0 | |
| | 10. From a second-rate shop in Edinburgh, | 20.8 | |
| { | 11. From another, do. do. | 22.7 | 80 |
| | 12. From a third, do. do. | 14.6 | |
| | 13. From a fourth, do. do. | 20.6 | 80 |
| | 14. From an inferior shop in Edinburgh, | 13.4 | |
| | 15. From a second, do. do. | 13.0 | |
| | 16. From a third, do. do. | 9.0 | 35 |
| | 17. From a fourth, do. do. | 7.2 | |
| | 18. From a shop in a county town, | 16.8 | 90 |
| | 19. From another of less repute in do. | 17.5 | 100 |
| | 20. From a third, do. do. | 15.8 | 90 |

The deficiency in No. 8 was probably accidental, because the druggist knew to what purpose his laudanum was to be applied,—which, it may be well to add, was not the case in any other instance. In the instance of No. 5, however, accident could scarcely account for the defect ; for the laudanum from the same shop was twice found defective at an interval of six months ; and besides it evidently contained some extraneous colouring matter. No. 20 also contained a large quantity of adventitious colouring matter, which, when the morphia was removed by ammonia, gave the liquid a dark crimson tint.

II. Having mentioned these examples of adulteration,—which

have been purposely chosen from among the drugs most in use, and which it would be easy, if necessary, to multiply to a far greater extent,—I may proceed to the next head of this inquiry, namely, to point out the sources of the practice in question. Under this head, those circumstances will be indicated in the commercial history of drugs which may lead to their adulteration, together with the several quarters where it seems to originate.

Here it will be necessary to apprise those who are not conversant with the commercial history of drugs, that they pass, most of them at least, through a considerable variety of hands before they are finally distributed in the retail trade. Articles of home produce, such as indigenous plants with their preparations, and chemical compounds of domestic manufacture, frequently pass at once into the possession of the retailer; but often too they are obtained by retailers, especially the smaller retailers of towns and villages, through the medium of wholesale druggists, and not directly from the herbalist or chemical manufacturer. Articles again of foreign produce accomplish their passage more indirectly still. The producer disposes of them to the foreign merchant, by whom they are consigned in general to an English drug-broker at some of our great sea-ports, and particularly at London. By the drug-broker they are sold at certain stated sales, usually by sample, and while in bond; and the principal purchasers are the wholesale druggists, or those great retailers who unite a wholesale trade to their other business. By them again the drugs are disposed of to retailers generally throughout the country; but frequently another intermediate step is made in the case of the small retailers in country districts; who purchase, not from the wholesale dealers, but from the larger retailers of the nearest great towns. It must be evident then, that the quarters where adulterations may be practised are sufficiently numerous.

There can be no doubt in the first place, that drugs from foreign parts are often adulterated before they arrive in this country, either by those who prepare them, or by the merchants abroad, to whom they are in the first instance disposed of. *Scammony* and *Gamboge*, whose adulterations have been inquired into above, are ascertained examples of this kind; and *Opium*, *Cinchona-bark*, *Senna*, and many other articles from distant countries, are equally well known to receive there the extraneous ingredients which are recognized in them by the European pharmacologist.

Some of these adulterations are in all probability practised with a distinct purpose of fraud. Such may be assumed to be the object where the adulteration is of a kind which may deceive the British importer and wholesale druggist. In regard to some substances, such for example as *Opium* and *Senna*, the deception is frequently, perhaps generally successful. In the case of opium I feel satisfied, that, so long as the wholesale druggist trusts to its external characters alone, he must be liable to be sometimes deceived. It is not easy otherwise to account for instances, which have come under my notice, of opiums widely different in real value having been bought and sold at nearly or absolutely the same prices, where the transactions took place between experienced individuals in the highest walk of their trade. As to senna, so successfully is it adulterated, that some of the first members of the wholesale trade in London are scarcely aware, that the highest-priced variety of this drug, the Alexandrian senna, is never pure, but invariably mixed to a considerable extent with another and comparatively inert plant: At least they were not aware of this fact in 1834, when I had occasion to converse with them on the subject. In these, and all other cases of the like kind, there seems reason for suspecting, that deliberate fraud is practised by the foreign merchant or producer.

But there are other sophistications also practised by the producer or merchant abroad,—and these probably the most numerous,—for which he is only in part accountable, or which at all events he practises without any intention of deceiving the merchant or wholesale dealer in Britain. For the spurious articles are perfectly well known to the home trade; and the wholesale price varies regularly with the purity of the imported article, and even according to its exact degree of purity. It is impossible, for example, to imagine that the maker or foreign merchant has any fraudulent view to personal profit in adulterating *Scammony* or *Gamboge*, as he actually does, to the extent formerly mentioned; because the external characters of the different qualities are precise and such as cannot be mistaken by any one of common experience; their import prices differ accordingly to a great extent; and in fact I have found by analysis, that these prices indicate very accurately their relative purity. What then, must be naturally asked, is the object of this practice? Is it that the wholesale druggist may be enabled to impose on the retailer with

the spurious articles? It would appear not. No retailer of moderate skill could be so deceived; and from many wholesale establishments the spurious drugs go forth for no more than their real relative value.

More opportunities of information than I possess would be required for investigating fully this apparent mystery. But I have had occasion to ascertain the true facts in respect to one instance of the kind, which will probably prove the type of many others of a similar nature. The conclusion to be drawn would seem to be, that the fault lies with the retailers, or must be shared between them and their customers. Whether such is really the case or not, it is not easy to decide. But I shall state the facts as they were communicated to me by a wholesale druggist of eminence in London, who authorized me to make them public. The subject of his communications was scammony, which he allowed is very rarely to be had pure from any wholesale establishment. The reason he explained to me was, that many of his customers in the retail trade,—and his own case was likewise that of all his brethren,—would not give a fair price for a pure article; that they did not ask for a pure drug, but for one of a particular price, often greatly under what it could be purchased for from the importer; and that on communicating with his Levant correspondent, and informing him what his customers wanted, he received for reply, that no Levant merchant could furnish good scammony at the prices proposed, and that it was therefore mixed up by himself and others with various proportions of chalk, to suit the varying demands of English dealers. The foreign merchant, whose letter I saw, complained of the necessity to which he was thus reduced of disgracing his occupation; sent specimens, five in number, of his several adulterations, specifying the proportion of chalk and of pure scammony in each; and requested his London correspondent to make the facts as generally known as he could to the medical profession. As one step towards executing his instructions, the information and specimens were made over to me; and on analyzing the latter, I found them to be composed almost exactly as represented.

It may be strongly suspected then, that some retailers are responsible for adulterations of the kind now alluded to;—that by unreasonably forcing down the price of some foreign drugs, they in some measure compel the merchant abroad to prepare spurious articles; which they receive, knowing them to be spurious.

Another quarter in which it may be supposed probable that adulterations are practised is in the establishments of the chemical manufacturers. From what was formerly stated in respect of iodine and the hydriodate of potash, it is plain that in some of these establishments spurious drugs are wilfully prepared, and fraudulently sold. In one of the instances adverted to, a representation was made to the manufacturers at my request, but without occasioning, at least for a twelvemonth, any improvement in the quality of an article which at the time had an extensive sale in both England and Scotland. I have met with other instances somewhat similar. I have also met with instances where upon inquiry the inferior quality of the preparation was found to have arisen from accidental oversight, and with others where the cause was in all probability the want of adequate skill. It must be farther added that a few expensive drugs, the produce of the chemical manufactories, are always impure, because they cannot be purified except at an enormous loss, while even in their impure condition they are both sufficiently dear and also quite active enough. Thus strychnia and veratria, as prepared for medical use, are invariably very impure, to the extent generally of at least 50 per cent, being never prepared in a state of purity except for the scientific chemist; and the reason simply is, that in their ordinary commercial state they are sufficiently energetic and very costly, while the pure alkaloids possess no particular advantage in a medicinal point of view, and could not be sold for less than twice or thrice the cost.

From such inquiries as I have hitherto been able to institute, it would appear, that, deducting, as seems reasonable, the instances where the impurity is either allowable or accidental merely, the adulteration of chemical drugs by manufacturers themselves is very far from being prevalent. There is on the contrary great emulation among chemical manufacturers to produce articles of the finest quality; very many of their most important products, are in all probability never intentionally adulterated; and certainly no retailer can be at any loss to obtain by far the greater part of drugs of this sort in a state of sufficient purity for medical use. A curious illustration of what is now said, which lately came under my notice, may be worth mentioning here, because it relates to a set of substances that have often been thought to be very impure. In consequence of having heard practitioners express

their belief that corrosive sublimate and calomel are frequently adulterated, and in particular that the latter is often adulterated with the former, I examined both salts as they are sold in Edinburgh ; and after a careful analysis of five different specimens of each, some from first-rate establishments, others from the most insignificant shops, it appeared that the least pure specimen of corrosive sublimate contained 97 per cent of real salt,—that the least pure of the specimens of calomel contained 96.6 per cent of genuine salt,—and that of ten calomels from ten different shops not one contained so much as a 500th of its weight of corrosive sublimate.

Farther, I am inclined to think, that where chemical drugs are adulterated by the manufacturer, the source of the practice is frequently, not fraudulent intention on his part, but,—as we have already seen to be the case in regard to some spurious drugs of foreign origin,—the necessity of meeting the orders of customers, who will not give the full price for a genuine article. There is no other apparent reason why a drug which ought to be tolerably uniform in its nature, such as the spirit of nitric ether, should be sold to retailers at prices so widely different as at present. There is no attempt at imposition on the part of the manufacturer, each quality bearing its own price. The purchaser of spurious articles cannot but know their quality from their price ; and consequently he is chiefly to blame for their being introduced into the market in the first instance, as well as for ultimately dispensing them to the public.

The next quarter in which adulterations may be practised is in the establishments of the wholesale druggists. There is still indeed another description of persons, besides foreign merchants and home manufacturers, through whose hands we have seen that many drugs pass before reaching the wholesale dealer,—namely the drug-brokers. But it is not conceived that adulterations to any material extent are practicable in that quarter, because the articles which pass through the drug-broker's hands are solely of foreign origin, and usually remain in bond in the public warehouses till disposed of by him, being sold chiefly by sample. The wholesale druggist, who may be said to be the great organ of communication between the retailers on the one hand, and the foreign merchant, home manufacturer, and herbalist on the other, has been very generally, though somewhat vaguely, accused of being the chief

cause of the extent to which adulterations are now practised. I believe it will be nowhere denied, that a considerable proportion of the impure and spurious drugs, now currently met with in the shops, are fabricated originally in the warehouse of the wholesale dealer. But, after what has been stated as to the adulterations practised by the foreign merchant and producer, a question naturally arises whether the wholesale druggist is entirely to blame for some of those which *he* practises. That there are unprincipled men in this branch of trade, as in every other, who make profit of their customers' ignorance by fraud and imposition, may be readily granted. But considering, that a great proportion of wholesale druggists do not make more profit by the sale of spurious articles than by those which are genuine, and that they do not necessarily sell the former as such, we are unavoidably forced to lay the blame on those persons who, for whatever reason, are purchasers at prices known and declared to be inadequate.

The more the practices of the trade are inquired into, the more must one become satisfied of the general fairness of the wholesale dealers in their department of it ; and at all events no retailer need be at any loss to obtain from them the best and purest drugs, provided he will pay the fair market price of them. I must also add, that from several of the wholesale dealers of the metropolis I have received, without possessing any claims whatever on their confidence, the most unreserved disclosures as to the state of the drug-trade, accompanied with expressions of unequivocal regret that they should be compelled to seem accessory to the frauds which are practised on the public, and with declarations of their willingness to co-operate in putting an end to them.

The farther then we proceed with this inquiry, the more reason does there appear for suspecting that the adulteration of medicines, in the shape in which they are made up for the retail market, is of a piece with one of the common vices of trade ; and that some persons, although they do not with their own hands fabricate the spurious articles sent forth by the wholesale druggist, chemical manufacturer, and foreign merchant, are essentially not less instrumental in fabricating them, by requiring that they shall be supplied at a price for which genuine drugs notoriously are not to be obtained, and by receiving and dispensing what they know to be sophisticated.

But this is not the only kind of imposition on the public for which

some retailers have to answer. Other adulterations are also practised directly in their own establishments. Such for example is the chief source of many spurious galenical preparations, the greater part of which must necessarily be made by the retailer for occasional consumption. Not a few of these indeed are of low quality, simply because the crude drugs from which they are prepared are themselves inferior. But besides, there can be no question, from such facts as those stated above in regard to laudanum, that the galenical preparations often owe their inferiority to more direct interference on the part of the retail dealer.

It does not seem necessary to inquire here into the several causes that have led to the practices among retailers now adverted to. But it is only fair to them to mention, that one obvious cause is the absurd propensity of many of their customers to value medicines rather by their cheapness than according to their quality and efficacy. It would be wrong were I not also to express my perfect conviction, that the profession of chemist and druggist contains many highly respectable individuals, whose undeviating desire is that no medicines shall either enter or quit their establishments except what are of undoubted purity, and who exercise a degree of skill and care to secure that object which would scarcely be believed by those not conversant with the nature of their trade. Nor can I advert to this circumstance without being farther called on to acknowledge, that I have been indebted for a great deal of valuable information on the very subject of the adulteration of drugs to several members of this profession. One gentleman especially, in extensive trade in this city, whose name for obvious reasons cannot properly be mentioned, has in a manner thrown open his whole establishment to my most minute inspection, and obtained for me a great part of the opportunities of instruction I have enjoyed. It may be well perhaps to add, that I have thus become cognizant of two general facts of no mean consequence in the present enquiry:—that on the one hand, in the present state of matters the most skilful and conscientious in the retail trade cannot always protect themselves against serious imposition,—and that on the other hand, among its respectable members there is no want of inclination to co-operate in any steps that may be taken to enhance the respectability of the profession, and to render the unprincipled amenable to the public for their misconduct.

III. It now remains to consider the last head, under which it was

proposed to discuss this subject,—namely the measures by which it seems most practicable to accomplish the prevention, or at least the abatement, of the present practice of adulteration. If the Colleges move in the matter, it is right that they should not go before the public without being prepared to recommend the adoption of certain checks; and therefore the following hints are thrown out for their consideration.

1. In the first place there can be little doubt, that, both for this and various other important purposes, the profession of chemist and druggist ought to be elevated as far as possible by an improvement in education, and protected by some of the rights due to a legally constituted Society or Incorporation. I have heard the Government of this country blamed for not having instituted such a body long ago; and in my opinion the evils which have resulted from the neglect on this head are far deeper and more extensive than most persons are aware of. On the very face of the question it certainly appears extraordinary, that, while in every other great European kingdom the profession of retail druggist is a highly respectable one, closely connected with science, incorporated by statutes, and exercised only by those who have undergone an express course of study, and been licensed after examination,—in Britain alone is it allowable for any man, no matter how ignorant and uneducated, to assume the name and character of chemist and druggist unchallenged.

The advantages of an institution for the protection and improvement of Pharmacy are manifold. For first, by conferring a certain *status* on the followers of what ought to be a scientific art, their character and respectability cannot fail to be greatly raised. Then, it will at once furnish the means of pointing out to the public those who are worthy of confidence. Farther, it is an important preliminary for the establishment of a board of education, by which the studies of the future members of the profession may be regulated, and their fitness for entering on it ascertained by examination. But again, it is also a necessary step for the accomplishment of one of the measures on which I am disposed chiefly to rely for abating the practice of adulteration, namely an effectual visitation of the druggist's shops. And, lastly, an institution of this kind appears not unlikely to promote the interests of science, more especially of chemical science. It is not trade alone, and the immediate interests of

the public, which have suffered in this country by the want of an institution for regulating and encouraging Pharmacy. Science, in this, as in many of its other departments, has been a deep loser by the ignorance or supineness of our successive governments. In France every *Pharmacien*, and in Germany every *Apotheker*, must have undergone a liberal education; and in particular he must have made chemistry a subject of careful study. And what has been the result? Simply, that this profession has supplied in each of these countries a multitude of the most eminent scientific chemists of Europe. In Britain, alas! we look in vain for a single chemist worthy of the name among those exercising the same profession.* And to what is this lamentable fact to be ascribed, except to the circumstance that in Britain all may, and most do, exercise it without any particular education at all, either in chemistry, or in other liberal arts or sciences? Germany and France may each number ten chemists of celebrity for one to whom Britain can point. Whence can this arise unless from the almost total want with us of a legalized profession to foster the science?

It cannot be expected that in the present place any details should be entered into as to the mode of constituting a Society of Pharmacy. But certain general principles may be here adverted to as essential to its success. 1. Its affairs should be entrusted to a Board, whose chief duties should be the examination of candidates for license and the visitation of druggists' shops. 2. In order to impart at once a due degree of respectability and some scientific character to its constitution and proceedings, it would be right that this board should in the first instance at least consist in part of members from the other branches of the medical profession. 3. While considerable liberality might at first be allowable in the admission of licentiates, these should eventually consist only of individuals who have undergone a certain course of study and an examination as to their fitness to practise pharmacy; and candidates should be required to produce evidence of possessing a competent knowledge of at least the following branches,—namely Latin, Chemistry, Botany, Practical Chemistry, Practical Pharmacy, and Materia Medica. 4. Licentiates of the college should be required to abandon medical and surgical practice. 5. It is not conceived to be at all necessary or even ad-

* I am informed the late Dr Murray commenced life as a retail druggist. But this and any similar instances do not affect the argument.

visible, that all chemists and druggists should be compelled to apply for a license. Entrance into the body may be safely left optional, at all events for some time,—but with the condition, that every unlicensed person who may assume the title appropriated to the licentiates of the body shall by doing so incur a severe penalty.

2. The second measure by which the frequency of adulterations may be in some measure checked is by our Colleges of physicians adopting in their pharmacopœias an addition, by means of which the attention of practitioners and of druggists may be pointedly turned to the most simple and accurate criterions for determining the requisite purity of drugs, and their freedom from certain known impurities. An alteration of this kind was resolved on a few years ago by the Edinburgh College of Physicians, and was proposed by them to the sister college of London in the course of certain negotiations towards the establishment of a conjunct or National Pharmacopœia. The London college, though apparently disinclined to the change at first, have since endeavoured to adopt it in the late edition of their Pharmacopœia. But, if the present were a fit occasion for criticising that publication, it would not be difficult to shew that this department of it is not exactly fitted for the practical purposes here contemplated.

From such attention as I have been able to give to this subject, I feel assured that a set of rules may be devised for almost every important drug, mineral, vegetable and animal, which any one may apply with the ordinary knowledge of practical chemistry now acquired by every medical student educated at the school of this city, and by means of which it may be ascertained that the customary adulterations are absent, and each article of the requisite degree of purity. It is undeniable that such a method of investigation, which combines chemical and external characters, is infinitely more precise and searching than the latter characters singly, which at the present moment are almost alone employed by practical men, on account of their ignorance of the former.

3. In the third place a great proportion of adulterations would be efficiently checked by a well organized system of visitation of shops. I confess that at one time little advantage seemed to me attainable by this measure. The length of time required to make a thorough inspection appeared so great as to render it impracticable for a moderate body of individuals to examine

properly any material number of establishments even once or twice a year without their whole time being devoted to the duty. But, since becoming more familiar with the external characters of drugs, as well as the applications of chemical analysis to the discovery of their adulterations, and since witnessing more especially the extraordinary tact and rapidity with which druggists of experience can ascertain the respective qualities of numberless samples of some kinds of drugs placed before them at the same time,—I no longer entertain any doubt that an effectual visitation of shops may be instituted by a properly organized body. For the success of a system of inspection it seems essential that a committee of inspectors should be appointed for each metropolis in the empire; that the members be nominated by the general body; that they have the power of nominating assistants or deputies in country districts; that they shall receive a salary in proportion to the duty discharged; that they shall be so numerous as to ensure the visitation of every shop at least twice a-year; that penalties be inflicted for the wilful possession of spurious drugs; and that these penalties be recoverable by a simple legal process.

Some may argue in opposition to the views here expressed of the utility of inspections, that the measure has been already tried in this country, and found to be inoperative. It is true that the Colleges of Physicians of London and of Edinburgh possess the right of visitation, and that this right has been long abandoned by the latter college, and is practised by the former with no material good effect. But it would be an easy matter to show that a College of Physicians is not the proper body with which to entrust so peculiar a duty; and in point of fact, though there were no other reasons for failure, it is quite sufficient to entail disappointment and ill-success, that such a body cannot be expected to produce a competent number of individuals of adequate practical skill. This line of argument, moreover, is very effectually answered by referring to the experience of France and Germany, where the task of visiting shops is lodged in the hands of the most eminent members of the Pharmaceutic Colleges, and where the inspections are consequently understood to be made with regularity, and vigour, and excellent effect.

In the fourth place, some might think that an effectual check against many adulterations would be found in similar visitations

of the warehouses of wholesale druggists ; which might be instituted the more easily, and carried on the more efficiently, that these establishments are few in number and confined to a few large towns. But insuperable obstacles exist to such a measure. It would be considered invidious to subject individuals to the superintendence of a body which it could scarcely be any part of their interest to join as members. Many wholesale druggists make preparations, both chemical and galenical, the processes and apparatus for which they are entitled to keep secret. Most of them supply to other trades besides retail druggists a great variety of drugs ; which, for any other purpose except medicinal use, may be of inferior quality, without material injury to the public, and which, therefore, it would be impossible to prevent them from vending in such a state. Besides, while an inspection of wholesale warehouses would prove but a trifling check on retailers, it would appear from what was formerly stated, that an effectual visitation of the retail shops, and an improved education of retailers, would soon extinguish in a great measure on the part of wholesale dealers the reasons which at present exist for practising adulterations. But farther, a considerable check might be imposed on the malpractices of unprincipled men in the wholesale trade, and also, it may be added, in the trade of manufacturing chemist, by enabling the retailer, who may have been convicted of possessing spurious drugs, to recover the penalty from manufacturers or wholesale dealers, where he can prove that the adulterations had been practised before the articles left their establishments.

Such are the measures for the prevention of adulterations, which appear the most easy to enforce, and most likely to answer their object. That difficulties will be met with in laying down the details, and that obstacles will arise at first on applying them in practice, no one can pretend to deny. But no useful object was ever attained in a civilized, and most of all in a free country, without serious difficulties and obstacles to be surmounted. And I am not willing to allow that the obstacles in the present case are at all likely to prove insuperable ; since it will be generally conceded that the object in view is most important, the means obvious and practical, and opposition not to be dreaded where alone it might prove powerful,—namely on the part of retail druggists ;—for it would be very extraordinary that they, at least the better class of them, should oppose a measure

tending so much and so directly to increase their professional as well as their individual respectability.

Neither on the other hand can it be imagined that the several checks which have been enumerated exhaust the possible list of corrective measures. Others will in all probability present themselves when the inquiry shall have attracted more especially the attention of druggists both in the retail and wholesale trade; to whose opinion, without a doubt, great deference ought to be paid. Without going any farther into the matter, I may suggest for example, whether means may not be found for preventing altogether even the importation of many spurious drugs, which are fabricated in foreign countries, and which it would be exceedingly easy to detect in their passage through the Custom-house. It might also be considered whether advantage might not be derived from the stated publication of authentic lists of the price of genuine drugs, and the annoucement from authority of recently observed adulterations. But these and various other subsidiary measures will be better left for that ulterior inquiry which it is hoped will be instituted upon the whole question.

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